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ALASKA AGRICULTURAL EXPERIMENT STATIONS
SITKA, ALASKA
Under the supervision of the
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BULLETIN No. 7

VEGETABLE GARDENING IN ALASKA

BY

C. C. GEORGESON
Formerly Director of the Stations

EXTENSION SERVICE
The Alaska Agricultural College
and School of Mines
COLLEGE, ALASKA

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ALASKA AGRICULTURAL EXPERIMENT STATIONS, SITKA, KODIAK, FAIRBANKS, AND MATANUSKA

[Under the supervision of the Office of Experiment Stations, United States Department of Agriculture]

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By C. C. Georgeson, *formerly Director of the Stations*[1]

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INTRODUCTION

This bulletin is intended for settlers and prospective settlers in Alaska and for others who may be interested in gardening in the Territory. The information given is based upon the results of investigations by the Alaska Experiment Stations during 29 years and should be useful to those who are planning to make Alaska their home. The great extent of the Territory and the variable climate make it necessary to refer briefly to the features which characterize the climate as a whole and to some extent to local conditions as regards temperature and rainfall during the growing season.

[1] Doctor Georgeson was retired Dec. 31, 1927, after nearly 30 years of active service as director of the Alaska Agricultural Experiment Stations.

CLIMATE

Successful farming and gardening everywhere depend upon the climate. Particularly is this true of Alaska, where weather conditions vary more than they do in other parts of the United States. The influence of the Coast Range Mountains with their snow-capped peaks, some of which are 10,000 feet high, is the dominating factor of the climate of the coast region and to a lesser extent also of the climate of the interior valleys. The moisture-laden winds from the ocean are chilled in their ascent over the range and consequently lose their power to hold moisture. The result is frequent and prolonged rainstorms over the region lying between the ocean and the range and over the islands in southeastern Alaska and Prince William Sound, and only a light rainfall for the growing crops in the interior valleys.

THE GROWING SEASON

The growing season is the period between frosts. This period is determined by latitude and isotherms or lines of equal temperature. The growing season in the coast region of Alaska is prolonged much beyond the limit in more southern latitudes having an inland climate, because of the influence of the Pacific Ocean. In the coast region the growing season is five months, from May to September, inclusive, and occasionally, for hardy vegetables like cabbage and rutabagas, which continue to grow after light frosts, may include October. In the interior, in the latitude of Fairbanks, the growing season is only four months, from May 15 to September 15. These limits are often curtailed or prolonged by the vagaries of the weather.

CLIMATE OF THE COAST REGION

In a general way there are two climatic belts—that of the coast region and that of the interior. The coast region is by far the best known. In the coast region the summers are cool, the winters are mild, and the rainfall is heavy. These features are due to the influence of the Pacific Ocean which, having nearly uniform temperature the year through, tempers the cold of winter and the heat of summer.

Records of the weather were kept at several settlements during the Russian occupation and have been continued and extended since the American occupation. Table 1 shows in condensed form the extremes of temperature and the average precipitation for each of the five growing months at seven representative places in the coast region.

TABLE 1.—*Weather conditions during the growing season for the coast region*[1]

Place	May			June			July			August			September			Average number of frost-free days
	Temperature		Precipitation	Temperature		Precipitation	Temperature		Precipitation	Temperature		Precipitation	Temperature		Precipitation	
	Maximum	Minimum		Maximum	Minimum		Maximum	Minimum		Maximum	Minimum		Maximum	Minimum		
	°F.	°F.	In.	°F.	°F.	In.	°F.	°F.	In.	°F.	°F.	In.	°F.	°F.	In.	
Ketchikan (latitude 55° 20′, longitude 131° 37′)	93	25	7.29	96	28	6.33	92	36	9.25	84	34	15.12	80	32	13.01	140
Juneau (latitude 58° 18′, longitude 134° 24′)	80	24	5.24	87	31	3.85	89	38	4.85	82	36	7.33	77	29	10.49	164
Sitka (latitude 57° 03′, longitude 135° 20′)	80	28	4.08	84	32	3.37	87	34	4.17	83	30	7.13	80	28	10.15	155
Cordova (latitude 60° 32′, longitude 145° 42′)	70	27	7.04	76	34	6.27	87	40	7.02	75	39	13.61	78	30	22.46	147
Seward (latitude 60° 06′, longitude 149° 27′)	77	22	2.67	84	32	2.30	88	40	2.50	85	33	6.55	84	27	10.10	131
Kodiak (latitude 57° 48′, longitude 152° 22′)	74	20	5.32	82	30	4.68	82	35	3.38	85	34	5.42	77	26	5.59	138
Dutch Harbor (latitude 53° 51′, longitude 166° 32′)	59	22	5.10	62	30	2.84	73	36	2.39	80	28	3.30	78	28	5.95	133

[1] Data in this table were compiled from the published records of the United States Weather Bureau.

Beginning with Ketchikan, in extreme southeastern Alaska, and following the coast line to Dutch Harbor, the seven places named are all under the influence of the ocean. The temperatures given are not average, but the maximum and minimum for the period under observation for each of the respective five months. The temperature is not likely to pass beyond these limits at the places named. The daily temperatures for each month register between the extremes and not very far from the average between the extremes.

The rainfall, on the other hand, represents the average for each month during the period under observation. In some instances the average rainfall figure is based on records covering many years, as, for example, at Sitka, where records have been kept for 80 years. In other cases the average rainfall figure is based on figures for a period of shorter duration, because settlement in such places has been much more recent. The rainfall varies in certain regions of the coast. In the extreme southern end of southeastern Alaska the rainfall is heavier than in the region about Juneau. The rainfall is very heavy in Prince William Sound but diminishes along the Alaska Peninsula to the Aleutian Islands, because the mountains there are lower and the winds consequently lose less moisture.

The temperature and rainfall also vary from year to year. Some years the precipitation may be nearly twice as great as in other years. In these latitudes there is no uniformity in weather conditions. Some seasons are wet and chilly throughout the growing period, and others are comparatively dry and warm, for the more rain there is the less sunshine and the less sunshine the cooler the season.

CLIMATE OF THE INTERIOR

The Coast Range Mountains to some extent modify the weather of the interior, causing a comparative shortage of moisture and cutting off ocean influences which otherwise would moderate the temperatures of winter and summer. Fortunately, the greater portion of the rainfall in the interior comes during the growing season.

Table 2 gives in condensed form the extremes of temperature and the average precipitation for each of the four growing months at seven representative places of the interior.

TABLE 2.—*Weather conditions during the growing season for the interior*[1]

Place	May			June			July			August			September			Average number of frost-free days
	Temperature		Precipitation	Temperature		Precipitation	Temperature		Precipitation	Temperature		Precipitation	Temperature		Precipitation	
	Maximum	Minimum		Maximum	Minimum		Maximum	Minimum		Maximum	Minimum		Maximum	Minimum		
	°F.	°F.	In.	°F.	°F.	In.	°F.	°F.	In.	°F.	°F.	In.	°F.	°F.	In.	
Anchorage (latitude 61° 13′, longitude 149° 52′)	71	20	0.59	79	20	0.58	79	36	1.93	80	31	3.06	73	21	2.28	99
Matanuska (latitude 61° 30′, longitude 149° 15′)	71	23	.67	76	30	1.10	82	36	2.16	76	32	2.60	67	24	1.75	102
Copper Center (latitude 61° 58′, longitude 145° 20′)	80	11	.40	96	21	.86	88	22	1.56	87	20	1.10	80	3	1.32	47
Nenana (latitude 64° 30′, longitude 149° 06′)	75	18	.64	84	35	1.53	94	37	2.26	84	30	2.41	76	15	.85	105
Fairbanks (latitude 64° 51′, longitude 147° 52′)	83	5	.51	95	28	1.44	99	30	1.85	87	19	1.90	80	11	1.29	89
Rampart (latitude 65° 30′, longitude 150° 15′)	86	10	.50	97	27	.99	97	32	1.33	96	23	1.59	85	7	1.28	79
Allakaket (latitude 66° 34′, longitude 152° 44′)	77	−17	.65	86	27	1.20	88	27	1.68	86	19	1.64	79	−3	1.41	56

[1] Data in this table were compiled from the published records of the United States Weather Bureau.

The climate of the interior is continental. In the absence of an ocean influence the land mass warms up rapidly in summer and cools with equal rapidity in winter. As a result the summer is warm but brief, and the winter severe and prolonged. Except in the mountains the snowfall is not usually heavy, 3 or 4 feet on the level being about the average. The summer rainfall is light, and later on irrigation may be advantageous in the drier regions, especially in parts of the Yukon and Copper River Valleys, where the rainfall is not sufficient for maximum crop production. The change from winter to summer is much more rapid than in the coast region. The planting season is nearly the same in both belts—usually in the two weeks from May 5 to May 20. Some seasons it is later and in others slightly earlier.

CLIMATE OF KENAI AND KODIAK AND NEAR-BY AREAS

On the Kenai Peninsula the climate is almost insular in nature, but colder and drier than in southeastern Alaska. At the Kenai Experiment Station, where continuous records of temperature and rainfall were kept for six years, the highest temperature, 89° F., for the period was in June, and the lowest, −43° F., was in December.

The average rainfall for the five growing months was 10.38 inches. The climate is favorable to hardy-vegetable production.

Kodiak and the near-by Afognak Island have likewise a climate that is favorable to gardening. On these islands, as at Kenai, potatoes were grown somewhat extensively under the Russian régime. During the growing season, however, there is considerable cloudy and foggy weather.

Still farther northward, along the coast of Bering Sea to Nome and beyond, the same conditions prevail. The region is treeless. Mosses and other arctic forms of vegetation gradually become dominant, and only the hardiest vegetables can be grown. Nevertheless, in favorable seasons successful gardens have been reported from Golovin and Council City.

This brief review of the climatic conditions in Alaska may serve to give the reader an idea of the difference in this respect between Alaska and parts of the States, with some of which all settlers in Alaska are more or less familiar.

SOILS

The soils of Alaska differ from those of more southern latitudes in several particulars, and are largely the result of glacial action. The surface generally is irregular. Extensive stretches of undulating land may be found in all parts of the interior and the action of water is everywhere apparent. Along the lower courses of streams and rivers extensive alluvial deposits have been formed, as is the case under similar conditions in all parts of the world. These silt deposits constitute the richest soils, but such valley lands are low and therefore more subject to late spring and early fall frosts than are the hillsides. Higher up the valleys extensive areas of nearly level gravel beds are frequently to be found. These are thinly covered with soil, as for example, in the Copper River Valley. The gravel shows unmistakable signs of wear, and the beds formerly were shallow watercourses. In many regions a yellow loam covers the gravel to a depth varying from 6 inches to 2 feet. In other places vast shallow lakes have given place to vegetation, gradually changing to swamps and finally to peat bogs, or the vegetable matter upon drying fully decayed and became a black peaty loam. In southeastern Alaska particularly this is the dominant character of the soil. It is the accumulation through the centuries of imperfectly decayed vegetable matter. This soil retains moisture with great tenacity and must be thoroughly drained before it can be successfully cultivated. Owing to the lack of warmth and the slow destruction of the vegetable matter the soil has become very sour, as is shown by its instantly turning litmus paper red.

At the Sitka station lime applied at the rate of more than a ton per acre apparently was insufficient for sour soil. The gradual and imperfect conversion of vegetable matter into soil is characteristic of all regions of Alaska and differentiates the surface mold from normal soil in the States. Muck and peat formations are found in all parts of the Territory, but especially in the coast region and principally in southeastern Alaska. These soils are unproductive until they have been thoroughly drained and limed, the quantity of lime required varying with the circumstances. Cultivation and

aeration will in time correct the acidity to some extent, so that fairly good crops can be grown, but the process is slow. Prospectors and settlers often complain of their unsuccessful attempts at gardening on the sour soils. Seed that is planted on a likely patch of land from which the moss and shrubbery have been removed fails to do more than sprout, or the young plants soon turn yellow and die and at best make slow and unsatisfactory growth. Failure is due to the acid condition of the soil, and not to the seed, the climate, or the country. The effect of an extreme case of acidity was shown at the Sitka station where the soil is an imperfectly decayed peat or muck. The ground was cleared in the fall of 1898. The vegetation consisted of scattered scrub pine, crowberries, cranberries, a small percentage of other plants, and a thick coat of moss. During the next three years the land was thoroughly drained, broken, cultivated, and an unsuccessful attempt was made to grow various crops. The strip through the middle of the plat was limed at the rate of 1 ton per acre, and the strips on either side were fertilized, one with potassium sulphate, 300 pounds per acre, and the other with kainit, 900 pounds per acre. The whole plat was seeded with oats. That portion which did not receive either fertilizer or lime was absolutely barren of growth of cultivated crops. The application of potash resulted in a feeble growth of oats, but applying lime in addition to potash produced a fair growth. Lime, then, makes the difference between a crop and no crop and should be used as a corrective of soil acidity unless the cost is prohibitive. Oats, of all the grains, is perhaps best adapted to unfavorable soil conditions.

In the coast region much of the arable land in past epochs was under the sea. The nature of the gravels and the marine remains testify to this. Gravel which is not too coarse and contains an abundance of humus and silt is in many respects most desirable for vegetable growing. Such soil, usually called warm soil because it absorbs heat readily, is well drained but must be fertilized to maintain its productivity. When these soils are fertilized they will produce most satisfactory crops of potatoes, cabbage, and other hardy vegetables and do not need liming.

The interior has a great variety of soils, but they are generally sandy, gravelly, or light loam in character. Extensive formations of clay are rare. The soils of river bottom lands which have been subject to overflow consist for the most part of silt and fine sand. Such soil is exceedingly rich and when not too wet can be made to produce anything that can be grown in the climate. This soil is often covered with willow thickets, and farther back on the borders of the uplands with spruce forests. There are thousands of square miles of soil of this description along the Yukon, Tanana, and Copper River Valleys, and in fact in all the large river valleys. The land is admirably adapted to vegetable gardening. (Fig. 1.)

Rich silt loams are found in the uplands of the Tanana, Susitna, and Matanuska Valleys. These are the best soils in Alaska for farming and gardening. The birch is partial to this type of soil and makes fine growth on it. Some of the uplands of the interior, as for example in the Copper River Valley, are for the most part thin and will soon become depleted of the immediately available plant food unless the land is fertilized to maintain crops. These soils

probably will need nitrogen more than any other element of plant food, and this can best be supplied by growing and plowing under green-manure crops.

CULTURAL CONDITIONS

ICE IN THE GROUND

Placer miners in the interior have demonstrated that the ground is frozen to an unknown depth. Exceptions are found in certain spots where there is a movement of underground water. In the spruce thickets at Fort Yukon and at Rampart ice has been found underlying the surface coating of moss in July; but where the surface was exposed to the full effect of the sun, the ground having been cleared and then covered with grass, the ice had receded to a depth of 2 to 3 feet. The underlying stratum of ice gradually thaws when the

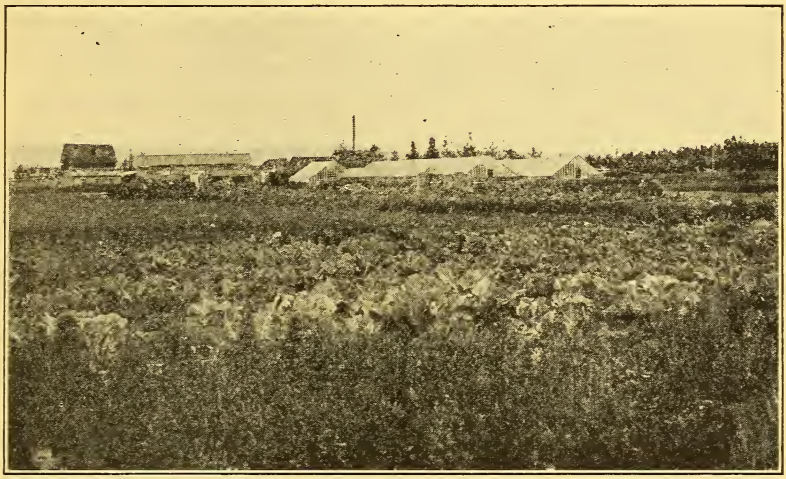

FIG. 1.—A garden at Fairbanks

ground is cleared sufficiently to expose the bare earth to the sun. On cleared land at Fairbanks the ground ice has melted irregularly, leaving an uneven surface with holes, some of which are 5 feet deep. So far as vegetable and grain growing is concerned, the ice is not a drawback. On the contrary, water from the melting ice by capillary action furnishes moisture to the growing plants and in dry seasons serves as a system of subirrigation.

DRAINAGE

Drainage is seldom needed in the interior, but is absolutely necessary in the coast region, where the rainfall is heavy. In exceptional cases the ground slopes sufficiently to permit surplus water to run off freely. In other places there is natural underdrainage in the form of a gravel bed or other porous subsoil; but where these conditions do not exist artificial drainage must be provided to carry off the water. On sloping ground it may be sufficient to have a ditch on the upper

border of the garden to lead off the water; or one or two open ditches can be made. Open ditches, however, are not desirable since they obstruct field work, especially when horse labor is employed. Covered drains are to be preferred.

Soil of peaty character can not be worked until it is drained. The drains in such soils should not be over 15 feet apart. At the Sitka station several acres of peaty land were reclaimed by draining. Ground that was almost impassable on foot before draining is now worked with teams.

Probably the most important points to be considered in constructing a drain are the outlet, the direction, and the slope. The lowest place in the field from which the water discharges constitutes the natural outlet. Thence an open ditch or closed drain should carry the water to a natural watercourse or pond. Most drains are laid to give the water free flow down the slope to a head ditch, which in turn discharges at the selected outlet. The slope of the several drains varies with the lay of the land, and this again causes a variation in the depth of the drains. A fall of 1 inch in 100 feet is sufficient in a well-constructed drain having a smooth, hard bottom, but the fall should be 5 to 6 inches in 100 feet when the drain is constructed by amateurs.

The ditch should be at least 4 feet deep, and only sufficiently wide to enable a man to work in it. The depth should vary somewhat with the lay of the land to afford the maximum slope, having as nearly a uniform grade as possible. A definite plan should be decided on, and the system laid out carefully before the work is undertaken. A surveyor's level should be used to lay out the system on an area of land 10 or more acres in extent, especially if the surface is practically level; but a carpenter's level may be used on smaller tracts, and a true eye and good judgment are sufficient where there is plenty of fall. The work should begin at the lowest point to permit immediate run-off of water.

Several kinds of material can be used to line the bottom of the ditch. Tiling is the best material, but is scarcely worth considering, since it is not manufactured in Alaska. Moreover, freight rates prohibit the use of tile, and a large percentage of it is broken in handling. The next best material is perhaps stone. Blocks about 6 inches or larger on a side should be used for the purpose. Rows should be laid against the wall on each side of the ditch, so as to leave a passageway about 4 inches wide between. The stone should be topped with larger rock, and then with smaller, and finally with fine brush to permit percolation of the water and prevent the earth from falling through and obstructing the passageway. However, stone will not often be used, as handling it is rather expensive.

Slabs, the outer cuts from logs, are the next best materials for building a conduit, and they have been largely used at the Sitka station. Throughout the length of the bottom of the ditch the slabs should be set on edge, and leaned against each other in the form of the letter A, with the round side in. The pieces are held together by nails here and there where the edges meet, and afford abundant openings for the water to pass through. On top of the conduit are packed first spruce poles, then coarse brush with butt ends down, and finally smaller brush, and on top of the brush first

a layer of sod and then earth. Such drains will answer the purposes effectively for many years.

When slabs can not be had the cheapest boards obtainable should be used. Deep notches 4 or 5 feet apart should be cut in the lower edges to allow passage of the water. The boards should be topped with poles and brush, as is done when slabs are used.

Poles and brush make a very effective and cheap drain. Poles 5 inches in diameter at the butt should be laid against the side of each wall. A third pole should be placed on top, care being taken to avoid having the openings too large. This packing should be topped with another trio of poles, and then with brush a foot thick to keep the earth from falling through. Drains of the kind at the station have been worked satisfactorily for 20 years.

If poles are not available the ditches can be packed with brush alone. It should be set at an angle of 60°, leaning upstream, and butt end down. The station has laid brush drains; but, when the brush decays, the dirt settles to the bottom of the ditch and the drain loses its usefulness.

FERTILIZERS

All Alaska soils are improved by the use of fertilizers. Manure is, all things considered, the best general fertilizer, but is scarce in most places owing to the limited number of domestic animals in Alaska. Manure varies greatly in fertilizing power according to the way it is cared for, the character of feed given the stock, and the quantity and kind of materials used for bedding. In Alaska, where hay and straw are costly, shavings and sawdust frequently are used to bed down the animals. When these materials are present in large quantities in the manure they have an injurious effect on the plants. On the other hand, such manure does not carry the seed of weeds. Horse manure acts more quickly than cow manure and is usually richer in plant food, because horses are fed more grain feed. Sheltered manure is better than manure which has been exposed to leaching by rains. Manure at the rate of 20 tons per acre is not too heavy a top-dressing and should be applied and thoroughly worked into the soil in spring.

Seaweed can be obtained anywhere along the coast and has demonstrated its value as a fertilizer for many crops.[2] It is especially efficacious on gravelly and loamy soils and is of little value on peaty soils. It has proved to be a good fertilizer for potatoes and cabbage and in less degree also for grain. Seaweed should be applied fresh at the rate of at least 20 tons per acre and plowed or spaded in thoroughly.

Fish scrap from canneries, dead fish, and all other organic matter from the sea also are valuable as fertilizers. Fish guano, a product which is manufactured at several places in Alaska, has been successfully used at the stations. It should be applied at the rate of at least 500 pounds per acre. For grain and other similarly sown crops fish guano should be applied broadcast on top of the plowed ground and worked into the soil with harrow or rake. For root and other crops

[2] The word "seaweed" as here used does not refer to any particular species, but is meant to include kelp and all forms of vegetation that are washed up by the sea.

that are grown in rows fish guano may be drilled in with the seed, especially if the amount available is small.

Commercial fertilizers such as sodium nitrate, potassium sulphate, and superphosphate are excellent fertilizers when they are used with judgment and in the proportions needed by the soil. Their original cost and excessive freight charges prohibit their use to any great extent in Alaska. Nitrates should not be used on peaty soil, but only on sandy, gravelly, or loamy soils, which are deficient in nitrogen. For garden purposes, when the soil is not naturally rich, a mixture of 200 pounds of nitrate of soda, 200 pounds of sulphate of potash, and 100 pounds of superphosphate is not too heavy a dressing to apply per acre. The mixture should be applied broadcast on top of the plowed or spaded land and worked in with harrow or rake.

Nearly all Alaskan soils, but particularly those of a black peaty character, need lime. Lime should be used in conjunction with all fertilizers when the soil is acid. Litmus paper should be applied to moistened soil to determine whether or not it is acid. If the paper turns red, the soil is acid. The tests should be made many times in several places and the intensity of the coloring noted. A rough estimate can then be made of the amount of lime needed per acre. The standard amount is a ton per acre for acid soil. By lime is meant freshly burned, unslaked limestone, which is an active alkali. Not more than a barrelful at a time should be slaked on a platform, and just enough water should be added to cause the lime to crumble into flour. The lime flour should be scattered evenly over the surface of the plowed field on a calm day and harrowed in. Lime is practically insoluble in water and can not therefore be expected to be carried into the soil by rain.

A green-manure crop is one which is turned under the soil to improve its fertility. Green vegetation of any kind should be plowed under, but especially such leguminous plants as peas, clover, and vetches. Leguminous plants have the ability to replenish the soil with nitrogen which they take from the air. This ability is increased through the aid of nodule-forming bacteria. Examination of pea, clover, and vetch plants usually discloses the presence of colonies of nodules on the roots. Cultures of nodule bacteria are used to propagate these bacteria on the roots of leguminous plants bearing no nodules. The cultures, which are sent from the laboratory in small vials, are dissolved in water and sprinkled over the seed while it is vigorously stirred. The bacteria adhere to the seed coat, and grow on the resulting roots, and increase the capacity of the plant to assimilate nitrogen from the air. Nitrogen is one of the most expensive of the fertilizing elements and can be obtained in the most economical manner through the growing and plowing under of green-manure crops.

GARDEN EXPOSURE

It is very important in these far-northern latitudes that the garden be located where it will receive the full benefit of the sun. A gentle slope to the south, the southeast, or the southwest should be chosen whenever possible. When choice must be made between good soil and a sheltered place having good exposure, the latter should be selected. The soil can be improved, but the exposure can not.

SOIL PREPARATION

In the spring the soil must be thoroughly plowed or spaded and the surface reduced to a level bed by the harrow first, if the area is large, and in any case by the vigorous use of a steel rake. The soil should be put in fine tilth and the roots of bushes and grass removed with equal care. Nearly all garden seed is small and can be properly covered only by a soil surface that is fine and level. To insure good growth the soil must be deep and porous. After being spaded, the surface should be leveled and pulverized with a rake as the work proceeds, care being taken not to pack the soil by stepping on it.

WINDBREAKS

Whenever possible the vegetable garden should be protected from the wind. The high winds and driving storms which visit Alaska usually are detrimental to growth, beating down small plants, breaking and tearing to tatters larger ones, and proving otherwise injurious. A windbreak, or shelter belt, should be planted on the north, east, and west sides of a garden having no natural protection. In southeastern Alaska the most destructive storms come from an easterly direction. The north wind is cold at all seasons. Southerly and southwesterly winds on the contrary usually are warm and mild.

The best tree for windbreak purposes in southeastern Alaska is the Sitka spruce and in the interior the white spruce. A belt of alder or willow can be used in the western coast region, where trees do not grow. In the forest area in the coast region young spruce trees can be obtained almost everywhere for the trouble of digging them, and they can be transplanted in that moist climate with a very small percentage of loss. Trees 6 to 8 feet high with branches reaching to the ground should be selected for windbreaks. Trees of this size can be handled with little trouble and used to afford some shelter immediately. The trees should be removed with plenty of roots and a ball of earth adhering to them. The roots should not be cut closer than 2½ or 3 feet from the trunk. Transplanting should be done in rainy weather in late April or early May. Holes for planting should be of sufficient size to accommodate the roots, and the trees should be set only as deep as they stood before. The soil should be carefully worked in between and well firmed about the roots. Isolated young trees are always well branched, which is an essential point.

The trees should be set in a double row, or better still, in a triple row, so that the back rows will cover the space between the trees in the front row. Close planting should be avoided as interlacing of the branches would cause the trees to die and thus defeat the purpose of the planting. Planting distance varies with the size of the trees, but 15 to 18 feet is sufficient to allow development as individuals for many years. In regions where the spruce can not be obtained the native willows can be grown for windbreaks. The willows should be planted very close.

The spruce of the interior is tall and slender. Some isolated trees 50 feet high have been found with branches not more than 3 feet long. The spruce resembles the Lombardy poplar somewhat, except in habit of growth. The spruce of the interior should be planted

very close, not over 5 feet apart, and at least in four, and preferably in eight rows, to make an effective windbreak.

HOTBEDS, COLDFRAMES, AND WINDOW BOXES

Hotbeds and coldframes are box-like structures used for starting the growth of plants in advance of their natural season in the open. Hotbeds and coldframes are alike, except that the soil in the hotbed is heated artificially, whereas that in the coldframe relies on the sun alone. Both types of frames are protected by a glass covering. These beds should preferably be located in a naturally well-drained place sheltered on the north, east, and west, and open to the south so as to receive the full benefit of the sun.

THE HOTBED

A hotbed consists of a pit to hold the heating material, a frame within which the plants are grown, and glazed sash to hold the heat within the frame. The pit should be 6 feet wide and of any length desired. The depth of the pit will depend on the amount of heating material to be used; usually 2 to 2½ feet is deep enough. The pit should be boarded up on the inside to keep the soil from caving in, and it should be provided with an outlet for water unless the natural drainage is good. For a more permanent hotbed the pit should be 6 feet wide, inside measure, and walled with stone or brick. The frames which extend above the pit are made of 1-inch boards 12 inches wide, and of a size as to carry one or more sash, as desired. The sash may be of any size, ordinary window sash being frequently used, but regular hotbed sash 3 by 6 feet are to be preferred as more convenient to handle. These sash are usually made of 2-inch material with the panes of glass so arranged as to overlap each other for about one-half an inch, like the shingles on a roof, so as to shed water.

The hotbed should face toward the south and be protected on the north by a building, tight board fence, or hedge, wherever practicable. The front of the frame should be 6 inches lower than the back in order that the water will readily run off the sash.

Where manure is plentiful the pit may be made 8 feet wide, and after filled and settled the frame can be set in place and banked on the outside with manure or soil to secure greater and more uniform heat.

PREPARATION OF THE HOTBED

Fresh horse manure is the most desirable material for use in producing heat, but should be mixed with some other material such as straw that is used to bed down horses, or with seaweed, spoiled hay, spoiled silage, or leaves. The manure should be spread out thinly and kept dry so that it will not overheat before using. At the Sitka station a mixture of 2 parts of fresh seaweed to 1 part of manure has given very satisfactory results. Fresh seaweed alone supplies only mild heat.

The heating material should be forked over until it is thoroughly mixed, then placed in the bed and packed 2 to 3 feet deep. The

frames and sashes should be set in place to aid in retaining heat. The frames should be straightened, leveled, and given a slope to the south. The manure will settle in the bed. A 6-inch layer of well-prepared soil should then be spread on top and the sashes replaced. The soil should be turned once or twice in the course of a week to permit it to warm up uniformly.

The bed should be ready for seeding by April 15, at which time seed of all the members of the cabbage family may be sown. Radishes and lettuce for early use may also be planted. Celery and such other crops as later will require transplanting should be started at this time. Early potatoes may be sprouted in the hotbed, but they will be too large to set out in the open when the weather warms up if started before April 15.

MANAGEMENT OF THE HOTBED

From the time the seed is sown until the resulting plants are removed, the hotbed requires constant attention. Ventilation is an important factor and must be carefully watched. A thermometer should be kept in a shaded place on the bed and the temperature held at 70° F. or thereabouts. To forget to raise the sashes during a few hours when the sun is brightly shining may result in disaster to everything growing in the bed. The sashes may be raised to any height desired by supporting them with 6 by 15 inch boards which have been notched four or five times in stair fashion. A garden sprinkler may be used to water the plants whenever necessary. As the weather warms up and the plants grow larger the ventilation must be increased. In mild weather the sashes should be used only at night. And finally, two weeks before the plants are to be transplanted in the open, the sashes should be removed altogether so that the plants may become hardened.

THE COLDFRAME

The coldframe should be made to fit the available sashes. (Fig. 2.) Ordinary rough boards answer the purpose well. The completed frame should be set in a warm, sheltered place and the sashes inclined about one foot in ten to the south. Fill the frame or box to within one-third of the top with rich, well-prepared soil and plant the seeds. The coldframe in all respects should be treated like a hotbed. A coldframe should be seeded some 10 days later than a hotbed. Otherwise plants that have advanced too far are likely to be caught by a cold snap. Both hotbeds and coldframes should be provided with covering for use at night and in cold weather. A light frame covered with two thicknesses of tar building paper affords perhaps the most economical and simplest protection and is easily handled. For use on a small scale large ordinary window sashes can be used for coldframes. In the absence of window sashes muslin may be used. The material should be tacked to the frame and coated with paraffin so as to shed water readily. Such a substitute, however, does not admit sufficient light and should therefore be removed whenever it is possible after the plants are up.

WINDOW BOXES

In the absence of a hotbed or a coldframe the seed can be started in small shallow boxes and kept in the window of the living room. The main difficulty in this case is to give the seedlings sufficient light after they start. Seed germinates promptly in a warm room. As soon as the young plants are up they must receive all the light possible. They must not be allowed to make spindling growth, and the leaves should be kept near the base of the plant. When three or four true leaves have formed the plants can be transplanted 2 inches apart in other boxes and set outdoors during the day to harden.

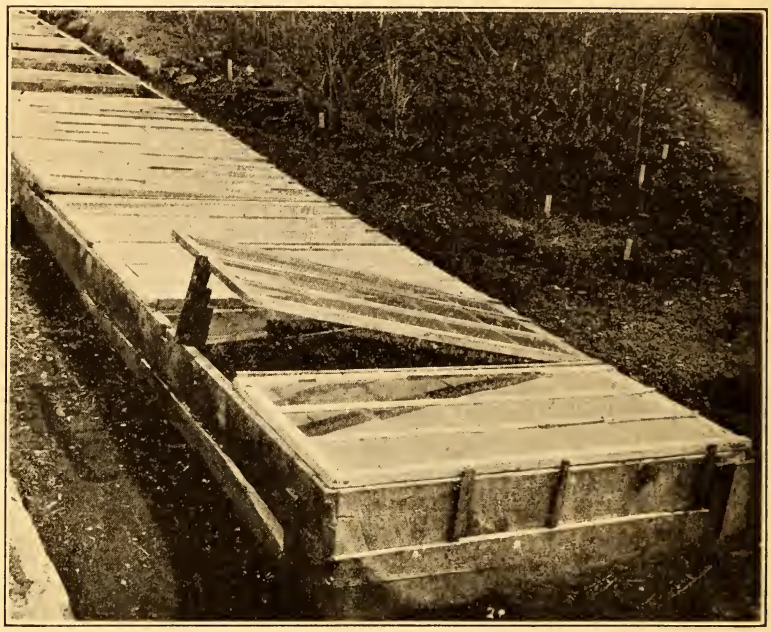

FIG. 2.—Coldframe with sashes in place, illustrating method of ventilation

SEED TESTING

The gardener may wish to test his supply of seed to learn whether it has sufficient vitality for planting. The plate-tester method is a good one to use. Place a given number of seed, say 100 if as many as that can be spared, on a piece of moistened woolen cloth in a plate or tin pan. Cover the seed with another similar piece of cloth which also has been moistened. Then place another plate on top of all to keep the cloths from drying out too quickly. The top cloth should be moistened every day or two, but water must not be allowed to collect in the pan. The plate tester should be kept in a room having a temperature of 70° F. or thereabouts. After a few days the seed will begin to germinate. A count can then be made of the number that have sprouted and the percentage of germination determined. The time required for germination varies with the different kinds and the age of the seed. Radish, lettuce, cress, and turnips germi-

nate in two or three days under favorable circumstances, but onions, parsnips, and parsley may require two weeks or more. If the seed is at any time chilled by exposure to low temperature, germination will be delayed.

CULTURAL DIRECTIONS

VEGETABLES

The vegetables which have been tried in Alaska may, for the sake of convenience, be divided into three groups, according to their hardiness and adaptability to climate and environment. (Fig. 3.)

Group 1 includes radishes, lettuce, mustard, cress, turnips, kale, Brussels sprouts, and native greens. These vegetables can be grown

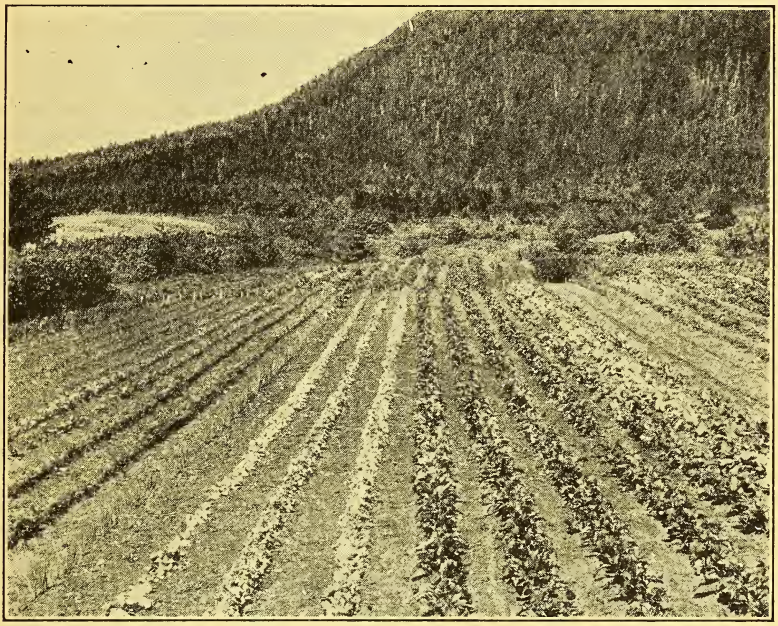

FIG. 3.—Plantings of various vegetables

throughout the whole coast region and in the interior, and north of the Arctic Circle nearly to the Arctic Ocean, in favorable seasons and in certain localities. Group 2 includes carrots, parsnips, parsley, peas, beets, the cabbage family, including cabbage, cauliflower, broccoli, and kohlrabi, rutabagas, the onion family—including onions, leek, ciboule, the tree onion, shallot, chives, and garlic—spinach, endive, horse-radish, rhubarb, beans, sea kale, and Japanese asparagus, and among the herbs, mint, sage, thyme, rosemary, white savory, horehound, sweet fennel, catnip, coriander, caraway, marigold, dill, anise, summer savory, sweet marjoram, sweet basil, and borage. This group can be grown everywhere in the coast region and in the interior nearly to the Arctic Circle provided that the gardens are selected with due reference to shelter and exposure to the sun. Group 3 includes asparagus, celery, cucumbers, squash, and salsify. These

vegetables can be grown in favorable seasons provided that they are planted in warm places and given the proper care.

Vegetables which can not be grown outdoors in Alaska under ordinary garden culture include sweet corn, melon, tomato, pepper, eggplant, okra, and pumpkin. Some of these, as the tomato, may succeed in a favorable season and in a protected place, but ordinarily it is wasteful of effort to plant them. Watermelons have been grown at Tanana Hot Springs on warm ground and under fostering conditions, such as covering the plants at night.

GROUP 1

Vegetables of Group 1 can be grown in nearly every inhabited part of Alaska.

Radishes.—The innumerable variety of radishes may be divided into three general classes, the turnip-rooted and olive-shaped sorts, the half-long sorts, and the long-rooted sorts. The first class, including the French Breakfast and Early Scarlet Turnip, are the earliest and should be chosen for first seedings. For later seedings the Long Scarlet is a favorite variety. Some of the large, so-called winter varieties can be kept until along in the winter, but they are not suited to the far north.

For early use the radish should be started in a hotbed. The short-rooted varieties, such as the French Breakfast, the turnip and olive shaped sorts can be grown in window boxes in soil 5 inches deep. The boxes should be so placed as to receive plenty of sunlight. When radishes are grown in the open the seed should be drilled in as soon as the frost is out of the ground, and successive sowings should be made every two weeks until August to keep the supply constant. The roots will not develop normally when they are crowded. The seed should, therefore, be sown thinly, four seed of the small-rooted sorts being allowed to the inch.

Several varieties of the Mammoth Japanese radish (Daikon) have been introduced into Alaska, and can be grown in southern Alaska in favorable seasons. Varieties that have given satisfaction at the Sitka station include French Breakfast, Olive-Shaped, Cooper Early Sparkler, Scarlet Turnip, Early Crimson Giant, Scarlet Forcing, Icicle, Hailstone, Wood Early Frame, Half-Long Scarlet, Early Long Scarlet, Giant White Stuttgart, White Strasburg Summer, and California Mammoth. The last three named and the Japanese sorts are late and large. The smaller and earlier varieties are recommended for general planting.

Lettuce.—Next to the radish, lettuce is perhaps the most commonly grown vegetable for early summer use. For early planting the seed should be sown in coldframes or window boxes. The soil in the window boxes need not be over 3 inches deep. The seed can be sown thickly and the tops cut and used as soon as they are 4 inches high, or if larger plants are wanted, the seedlings can be transplanted to other boxes and spaced 3 inches apart each way. Lettuce is not very hardy and will not make much growth outdoors until the weather warms up. When the weather permits outside growing, the seed should be sown in rows and covered one-fourth inch deep. After the plants are 2 inches high they can be transplanted to other beds and set 6 inches apart in the row. Plants that are raised in the house

also may be transplanted, but prior to transplanting they should be set for a week at least in a sheltered place and exposed to the outer air to harden.

There are two general classes of lettuce each containing several varieties. In one the plants form a more or less solid head. In the other they do not. The nonheading varieties are the best for early use. Simpson Early Curled and Simpson Black Seeded are favorites for this purpose. Of those which form heads San Francisco Market has been very successful at all the stations. Large Hanson, Philadelphia Butter, Morse, Victoria, Cabbage, and Boston Market have been grown successfully in Alaska. Other varieties that have given satisfaction at Sitka include Big Boston, All Seasons, Passion, May King, Giant Crystal Head, Mammoth Black Seeded Butter, California Cream Butter, Cold Frame White Cabbage, Grand Rapids, Early Prizehead, and Denver Market.

Mustard.—Mustard grows quickly, and the leaves can be used early for greens. In the far north mustard is the most satisfactory of the cultivated plants for use as early greens. The seed should be sown rather thickly in rows as soon as the ground can be put in condition in the spring, and the leaves cut as soon as they are large enough for use. A second cutting may be made in two or three weeks. White London and Chinese Broad Leaved are favorite varieties for the purpose. The plants have a tendency to run to seed immediately in cold, wet weather.

Black mustard yields the mustard seed of commerce. This sort also can be grown in Alaska, but the seed should be gathered before it shatters so that the plant will not become a weed.

Cress.—Cress or peppergrass is a quick-growing annual which is used as a salad and for garnishing meat. For early use the seed should be sown thickly in window boxes, then covered lightly with sand and kept moist. Germination usually is prompt. When the young plants are 3 to 4 inches high they can be cut just above the roots with a sharp knife and served as a salad. Unless the plants are cut they soon run to seed. The seedlings should stand thickly. Cress can be grown in winter if desired. The seed should be sown in rows in the open every week during the summer if a continuous supply is wanted. Much seed will be required for this purpose, but it is not expensive.

Turnips.—Turnips are so well known as scarcely to require mention here. They are successfully grown over most of Alaska. In fact, they are of better flavor, more tender and buttery, and of larger size in Alaska than in more southern latitudes, where the tendency is for them to become stringy and tough and strong in flavor. Radish, lettuce, and turnip are the three vegetables which the prospector and miner desire to grow more than all else. The young leaves are rather tough, but in an emergency can be used as greens, and the roots soon reach usable size.

Turnip seed can be sown broadcast or drilled in as soon in the spring as the ground can be put in condition. When the plants are well started they should be thinned at least to 3 inches apart in the row. When sown broadcast the seed can be sufficiently covered by raking it into the surface. When drilling is practiced the seed should

be covered by the soil to a depth of about half an inch. All varieties so far tried have done well. Some of those which may be depended on to give satisfaction include Petrowski, White Milan, Purple Top Strap Leaf, Yellow Finnish, White Finnish, White Egg, Early Snowball, Early Dutch, Gratchoff, Golden Ball, Aberdeen, Yellow Finland, Red Finland, Bortfelder, Iceland, and Ostersundom. Purple Top Strap Leaf grows very large. Turnips weighing 10 pounds are not unusual in Alaska.

The Petrowski turnip deserves to be described somewhat in detail. The seed was introduced from northern Europe into Alaska through the Office of Foreign Seed and Plant Introduction, United States Department of Agriculture. The seed was first grown at the Sitka station in 1906 and designated Petrowski No. 19554. It proved to be so superior to other varieties that the seed has been grown and distributed by the stations for many years. In addition to its fine table qualities, the Petrowski turnip is comparatively free from root-maggot attack.

The variety has a flat root with a concavity in the bottom from which a single slender root emerges. The root is medium in size, about 4 to 6 inches in diameter, is yellow, and has a tough skin. The true type is perfectly symmetrical in shape and has no side roots, and the leaves are small and spread horizontally on the ground. The variety does not keep well; after a few months in storage it becomes dry and pithy. Settlers in Alaska have with practical unanimity pronounced the Petrowski the best turnip for the far north.

Rutabagas are a variety of turnip. They require a longer growing season and can not be grown successfully as far north as can the turnip. (See p. 24.)

Kale.—Kale, also known as borecole, is successfully grown everywhere in Alaska, and is cultivated like cabbage. The seed may be planted in hotbeds, coldframes, or in window boxes. Toward the end of May the young plants should be set 1½ feet apart in rows 2 feet apart in the open. Growth is somewhat slow at first, but the plants develop more rapidly toward fall. Kale is hardy and is not injured for table use by temperatures not falling below zero. The plants will keep perfectly outdoors under several feet of snow and can be dug out as needed. Kale is improved in flavor by a touch of frost. This vegetable makes most delicious greens for fall and winter. Kale should invariably be boiled. The leaf should be stripped from the midrib, cut up coarsely, and boiled for two hours with either salt pork or corned beef, preferably with the former. After draining, mix with potatoes which have been boiled separately, and serve hot. Kale deserves to be much more generally cultivated in Alaska and will be when its merits and uses become known. Of the few varieties the best for table use is Dwarf Green Curled Scotch, which does not grow more than 12 or 18 inches high and has very crisp, curly leaves. Tall Scotch is largely grown as a cattle feed in northern Europe, and Dwarf Purple, a purple or variegated sort, is used for garnishing meats and salads.

Brussels sprouts.—Brussels sprouts is a form of vegetable closely related to kale. It is hardier than cabbage and like kale may be left in the ground during the winter with no protection other than that afforded by the snow. Like kale also, Brussels sprouts is improved

in flavor by light frosts. Severe freezing kills it. Brussels sprouts should be raised, transplanted, and treated exactly like kale, except that the plants should be set only 15 inches apart in the row. The plant produces a stalk 2 feet high, with many leaves. The buds in the axils of the leaves develop into small heads which form the edible portion. Varieties which are recommended for trial include Improved Half Dwarf, Odense Market, Dwarf German, and Long Island Improved.

Native greens.—Alaska has at least two plant species which deserve to be mentioned as greens. Neither plant is cultivated. One is a plantain commonly known as sea lettuce (*Plantago maritima*). It grows in the pockets of rocks along salt-water beaches, and is nowhere abundant. Sea lettuce produces a tuft of narrow nearly upright leaves, which are unsurpassed in flavor when they are cooked like spinach. The other plant is commonly known as "strawberry blight" (*Blitum capitatum*), and is abundant in the interior. This plant has triangular, crisp leaves and produces stems 6 to 8 inches high with bunches of red fruits resembling strawberries. The fruit is tasteless, but the leaves have a flavor somewhat like that of spinach. Strawberry blight is a favorite with many of the local prospectors.

GROUP 2

Vegetables of Group 2 can be grown in most of the settled parts of Alaska although they may not succeed north of the Arctic Circle unless the season is favorable. They are described about in the order of their hardiness.

Carrots.—A porous loam is preferred for carrots. They do not thrive in peaty soil. The seed should be sown thinly and covered about three-quarters of an inch deep in rows 2 feet apart. When the plants are well started they should be thinned to 2 to 4 inches apart in the row, according to the size of the variety grown. For early use carrots can be sown broadcast in coldframes. Early Forcing, a very small, round-rooted, rapid-growing variety, is best adapted for the purpose. Varieties which have been successfully raised at the stations include Early Scarlet Horn, a short, thick root which is ready for use before the larger sorts, Oxheart, Chantenay Half Long, Danver's Half Long, and Champion. The stump-rooted and half-long varieties are best for table use. White Belgian and Yellow Belgian produce heavy yields and can be used as a stock feed. For winter use, carrots should be packed in moist sand in a cool but frost-free place. Carrot seed has been matured at Rampart and Fairbanks stations.

Parsnips.—Parsnips require a longer growing period than carrots and are not likely to succeed where the ground is cold or wet. In southeastern Alaska they do well everywhere. They grow best in a deep, rich, sandy soil. The seed germinates slowly. Parsnips should be sown in the open and covered one-half to three-quarters of an inch deep in rows 2 feet apart as soon as the ground can be put in condition in the spring. The plants should be thinned to 3 or 4 inches apart so as to give them ample room in which to develop normal roots. Hollow Crown is the leading variety in Alaska, and forms a rather short, thick root which is sweet and tender. Improved Guernsey and Magnum Bonum are also of good quality. Long

White sends its roots deep into the ground. Parsnips can be kept in the ground all winter and are improved by frost.

Parsley.—Parsley is used chiefly to flavor soups and stews, and to garnish meats. In this country, only the leaves are used, but in Europe certain varieties are cultivated for their large, fleshy roots. Parsley should be sown about half an inch deep in rows 1½ feet apart as soon as the ground can be put in condition. Parsley seed germinates slowly and should therefore be soaked in warm, not hot, water for a few hours before sowing and not allowed to dry again. (This is true of all seed.) The leaves can be picked for use as soon as they attain usable size. There are only a few varieties of parsley. Triple Curled is a leading favorite. Moss Curled and Emerald are other good varieties. In the fall the roots can be taken up and planted in boxes. The boxes should be kept in the house. Another method of supplying parsley at any time for home use is to bore inch holes reasonable distances apart in a barrel, fill the barrel with soil and insert a parsley plant in each hole. The barrel should be set in a light, warm place.

Peas.—Peas may be classified as early, medium, and late, and according to growth as dwarf, medium, and tall. They are also classified as smooth and wrinkled, the wrinkled sorts being the better flavored. The early varieties are dwarf, though the Alaska is an exception to the rule. In the rainy belt of southeastern Alaska all varieties of peas grow taller than in the drier interior. The plants are comparatively hardy and are not injured by light frosts. The seed should be planted 2 inches deep in the open as soon as the ground can be put in condition in the spring. In the States peas usually are grown in succession, the main crop being planted later than the early one. In Alaska all should be planted early. The tall-growing sorts can be used to supply the late market. In the garden, peas are always planted in rows. The best plan is to sow the seed in beds of two rows each, with 6 inches between the rows, and leave a walk 2 feet wide between each bed of two rows to facilitate cultivation and "brushing." Dwarf varieties like American Wonder and Blue Bantam require no support. All varieties growing over 1½ feet high should be provided with supports of brush. The butt end of the brush should be sharpened and set in the ground just outside the rows of peas. Two rows of brush with tops leaning together should be used in preference to single rows. Peas will grow in any soil, but will not do well in peaty soil unless it has been limed.

The following varieties have been grown at the stations and are recommended for trial: Alaska, also called Earliest of All, is perhaps the earliest-maturing variety so far tried. It is a pea of good quality and a favorite for canning because most of the pods reach the same stage of development at the same time. Alaska is not a dwarf pea. It grows 3 to 4 feet high in the coast region and about 2½ feet high in the interior. Alaska has been used as a field pea because it is early and matures in the short summer of the interior. Alaska also gives promise of being in demand by canners, who must have seed that produces an early, uniform crop. Other varieties doing well include Extra Early, McLean's Little Gem, Nott's Excelsior, Gradus, Premium Gem, Advancer, Horsford Market Garden, and Thomas Laxton. These are medium in height. Late tall sorts include Alder-

man, Prince Edward, Duke of Albany, Telephone, and Quite Content, all of which have large pods each containing 9 to 11 peas of superior quality. Tall Sugar, the so-called sugar pea, is a variety with edible pods. It has grown 8 feet high at Sitka.

Beets.—Beets are more difficult to grow than any of the foregoing, though in average summers and on well-drained land they do fairly well. Beets 4 inches in diameter and even larger can be grown in favorable seasons. On wet ground the plants run to seed almost immediately, instead of forming roots. The seed should be sown thinly in rows 1½ feet apart at about the same time that carrots and parsnips are planted. Each beet "seed" contains three germs, and if all grow the plants must be thinned out. Those which are removed can be transplanted or used as greens. Early Bassano is a good early variety of rather light color. Early Blood Turnip is a dark-red variety with good keeping qualities. Crosby's Egyptian is another early and desirable variety. Dark Red Turnip is still another good variety and is slightly later than the foregoing. All of these are globular or turnip-rooted in form, and are better adapted to Alaska than are the longer rooted and later sorts. Young beet leaves make excellent greens.

The cabbage family.—Cabbage, cauliflower, broccoli, and kohl-rabi are members of the Cruciferæ family and should be treated alike.

Root maggots (*Anthomyia brassicæ*) attack all members of the Cruciferæ family. The maggots are the larvæ of small flies which lay their eggs on the leaves or on the stems of young plants. When the eggs hatch the maggots wriggle down the stems into the ground, find their way to the roots, and begin to feed on the plant juices. When the maggots are numerous the plants soon droop. The damage can be lessened but not wholly prevented. The stations have endeavored to protect the plants from the pest by shields of tar paper. Pieces of heavy tar paper are cut 3 or 4 inches square. A hole large enough to admit the stem of the plant is punched in the middle, and a slit is made to one side. After the plant is set in the ground one of the squares is slipped carefully about the stem, fitted snugly around it, and patted smoothly on the soil. This keeps the maggots from getting to the root, and is the most effective and economical method tried.

Another partial preventive is to surround the base of the stem of newly set plants with about half a teaspoonful of tobacco dust. Applications should be made two or three times, increasing the amount each time until the maggot season is over.

Still another method is to apply a couple of tablespoonfuls of a weak solution of corrosive sublimate (1 ounce to 10 gallons of water) to the base of the stems once a week until the pest abates. This of course requires time and expense. Applications of ashes, lime, and hellebore powder have been tried at the stations without appreciable effect.

Cabbage, a universally cultivated garden vegetable, can be grown in favorable seasons as far north as the Arctic Circle, but in unfavorable seasons may fail even in southeastern Alaska. (Fig. 4.) The seed should be sown about April 15 in hotbeds, coldframes, or shallow window boxes. When the plants have produced three or four leaves they should be transplanted 2 or 3 inches apart in coldframes. In

late May or early June they can again be taken up and set in the open. Part of the soil should be left on the roots so that the plants will receive only a little setback from the transplanting process. House-raised plants should be hardened by gradually exposing them to the air in the daytime and finally also at night for about two weeks before transplanting. A sudden change of temperature may stunt growth. The seed can be sown in the open in favorable seasons where the plants are to remain after thinning to the proper distance. The weakest plants should be removed. Early cabbage should be set 18 inches apart in rows 2½ or 3 feet apart. Late cabbage requires more room and should be set 2 feet apart in rows 3 feet apart. Frequent hoeings help growth.

FIG. 4.—Cabbage as grown at Sitka station

Cabbage and cauliflower have been raised with conspicuous success in the bay window of a prospector's cabin. The plants thrive best in a rich, sandy, thoroughly drained soil. These vegetables do not thrive on peaty soil unless the natural acidity has been neutralized by the use of lime. Cabbage is successfully grown in large quantities on the sandy soil about Skagway and also at Fairbanks. In favorable seasons both early and late varieties do well, but when the season is cold and backward only the earliest varieties can be expected to head.

Many varieties have been tested during the last 29 years at the Sitka station. The success of any given variety depends largely on the season and on the soil in which the crop is grown. Cabbage is a gross feeder and must have a rich soil. Probably the best fertilizer for cabbage is well-rotted barnyard manure. If it can not be ob-

tained, seaweed, fish scrap from the canneries, fish guano, or a high grade of commercial fertilizer may be used. Varieties are divided into two general classes, early and late. The early sorts are more certain of producing a crop. Early varieties include Early Jersey Wakefield, Early Winningstadt, Early Summer, Extra Early Express, Early York, Baseball Early, Early Dutch, Copenhagen Market, Glory of Eukhuizen, and Succession. Late varieties include Danish Ballhead, Late Drumhead, Danish Roundhead, Stone Mason, Drumhead Savoy, Red Drumhead, and Late Flat Dutch. Savoy cabbage has crinkled leaves. Red cabbage is grown chiefly for pickling and decorative purposes.

The larger seed houses are in the habit of calling selected strains of cabbage and other vegetables by the firm's name. It may be taken for granted that such houses will not risk their reputation by attaching their names to inferior varieties.

Cauliflower succeeds even better than cabbage. Heads measuring 14 inches in diameter have been produced at the Sitka station. The head is only an undeveloped bunch of thickened flower stems. Cauliflower is raised and cultivated exactly like cabbage, except that the former is planted closer. Two feet by a foot and a half ordinarily gives the plants sufficient room. After the plants have been properly hardened they may be transplanted to the open in late May or early June. Well-advanced plants may have marketable heads by July 4. Hoeing should be frequently practiced to suppress weed growth and keep the soil loose. When the weather is bright the midrib on one or two of the inner leaves should be broken over and the leaf bent to shade the heads and keep them from turning brown. The quality of Alaska-grown cauliflower is unsurpassed. A good crop can be produced in September in favorable seasons if the seed is sown in the open about June 15 and the young plants are transplanted in July.

Of all the varieties tried at the stations, Early Snowball is the best. It is certain to head, and the heads are large, mature early, and keep well. Extra Early Dwarf Erfurt has done almost as well as Early Snowball. Early London and Early Paris have done only fairly well. They are not so certain to head, and the heads are not as uniform as those of the other varieties. Good seed is of first importance in cauliflower growing.

Broccoli is a variety of cauliflower. The plants are raised and treated like cauliflower and produce similar heads. At Sitka the plants were found to be rather later than the early varieties of cauliflower and not quite so tender. Some of the varieties have purple heads, and even heads which are claimed to be white are splashed with purple. Broccoli is said to be hardier than cauliflower and the seed is less expensive. The edible portion of both cauliflower and broccoli is the budding flower stem.

Kohl-rabi is intermediate in character between turnip and cabbage. Kohl-rabi grows like cabbage but forms at the surface of the ground a thick globular bulb resembling the turnip. The bulb is the edible portion. Kohl-rabi should be used while young, because it becomes tough and stringy with age. The seed should be sown in drills in the open in early May. The rows should be 2 feet apart and the resulting young plants thinned to 8 inches apart in the row. Kohl-rabi is hardy and can be grown in Alaska wherever rutabagas can be

grown and the roots can be overwintered in the root cellar. Kohlrabi sometimes is grown for use as a cattle feed. Of the several varieties grown at the stations Early White Vienna is recommended for trial. The roots are prepared and cooked like turnips.

Rutabagas.—Rutabagas, also known as winter turnips and swedes, require a longer growing season than does the common turnip. They also keep better and can be grown to perfection in Alaska. The town of Haines has acquired a reputation for its fine quality of rutabagas, some of which are shipped even to Seattle. The seed should be sown in rows 2½ feet apart. When the plants are large enough they should be thinned to 8 inches apart. Frequent hoeing is advisable. Varieties which are recommended for trial include Golden Heart, a medium-sized, globular-shaped root of yellow color; Improved Purple Top, a large yellow root of excellent quality; Yellow Swedish, a medium-sized type; and Budlong's Improved, a white root. Rutabagas make their best growth in early fall, and can be stored like potatoes.

The onion family.—Alaska gardeners have not been very successful in growing onions from seed. The average summer weather is not warm enough for their best development. However, in many instances onions measuring upwards of 2 inches in diameter have been grown. The onion is valuable in the formation of balanced dietaries and should be frequently eaten by people who must live largely on canned goods. The vegetable should be found growing in every garden, even though the prospects for great success are not promising. Onions may be grown either from seed or from sets. Onions from seed are for winter use, although they can be used for green onions as soon as they are of usable size. Onions from sets are ready for table use almost as soon as radishes and are available all summer. Sets are of two kinds, small onions that have been grown from seed the previous year and small bulbs which develop in the tops of the so-called tree onions. Small onions are preferable to the bulbs, though the latter keep better. Varieties which are adapted only to warm climates should not be selected for trial in Alaska. These include the Bermuda, the Giant Rocca, the Madeira, and all others having Spanish or Italian words as part of their names.

Onion seed should be sown thinly in rows 1 foot apart as soon in the spring as the ground can be put in condition. The seed germinates slowly. When the resulting plants are well established they should be thinned to 2 or 3 inches apart in the row. Weeds must be suppressed and the soil kept mellow by frequent hoeings. Onions succeed best on a rich, well-drained, sandy loam. Under favorable conditions young seedling onions should be large enough for use by early August. At the appearance of frost they should be pulled and spread in an airy place to dry. The tops and roots should then be removed and the bulbs stored in a dry, cool, frost-free place for winter use. Onions as large as pecans can be used for sets the following spring. The settler in the interior who fails to purchase sets from the outside should raise his own sets in this manner.

Onions from sets should be spaced 3 inches apart in rows a foot apart early in the spring, being planted so that the tops will be just below the surface of the ground. Onions from sets are ready for use when they attain a height of 5 or 6 inches. Top onions can be

used for sets, and they have the advantage of keeping better, and therefore are more likely to remain good during a long winter. On the other hand, they do not produce such large onions. Onion seedlings can be raised in hotbeds, coldframes, or window boxes and transplanted to the open about May 15. The seedlings will have a longer growing season and make larger growth than onions that are sown in the open. The varieties giving satisfaction at the stations include Red Wethersfield, Yellow Danvers, Prizetaker, Australian Brown, White Portugal, and Silver King.

Leek is an onion which is grown for its leaves and thickened stem. It has a mild flavor and is extensively grown in Europe for use in flavoring soups and stews. The seed is sown in the same manner and at about the same time that cabbage seed is sown. The young plants should be transplanted to the open about June 1. They are not likely to make large growth and should be set 6 inches apart in rows a foot apart. Leek is used throughout the summer and fall. It is not hardy and must be taken up before frost. Leek may be stored in damp sand in a frost-free cellar until wanted for consumption.

The following members of the onion family are not generally known, and the seed and plants are therefore seldom offered for sale by seedsmen. These species, nevertheless, are valuable for Alaska because they possess the antiscorbutic properties for which onions are prized, and most of them are hardy and can be grown with little trouble.

Ciboule or Welsh onion (*Allium fistulosum*) is a hardy plant which produces green stem onions instead of underground bulbs. The seed should be sown in the spring. Ciboule lives through the winter in the coast region and hence can be sown in the fall for early onions the next year.

The tree onion (*Allium cepa bulbellifera*) produces a small cluster of onions at the top of the stem. Seed is not produced. This vegetable is planted like shallot. The bulblets are used for pickling, for sets, and like other onions.

The shallot (*Allium ascalonicum*) is a small onion which is propagated by sets, though it also produces seed. The bulbs should be planted individually, being set 6 inches apart in the row in spring. The bulbs grow in little clusters just below the surface of the soil. After growth has started the earth should be slightly scraped from about the new onions to permit them to form at the surface of the ground. They are taken up in the fall and kept frost-free during the winter. Shallots are rather strong in flavor and are used like other onions.

Chives (*Allium schœnoprasum*) is a hardy perennial which produces clusters of short leaves. It is used for flavoring and can be grown in the far north. Once established the plants last indefinitely without attention.

Garlic (*Allium sativum*) is a hardy perennial onion, the cultivated form of which is used for flavoring. Like the shallot, garlic forms little bulblets about the root. A few plants are sufficient for the needs of the family.

Spinach.—Spinach has not done very well in Alaska. Spinach is a success when the summers are warm but fails either completely or in part when the seasons are cold and wet. The vegetable requires

a rich, well-drained soil. The seed should be sown in rows 6 inches apart or broadcast in the early spring. Spinach is used as greens. On wet soil the vegetable runs to seed immediately.

Endive.—Endive is a hardy plant used as a salad in the fall of the year. The seed should be sown on a small bed in early spring, and when the plants are 3 inches high they should be transplanted a foot apart. In early September the leaves should be tied up around the heart of the plant, to blanch the interior leaves and make them tender and palatable.

Horse-radish.—For some reason the horse-radish has not yet obtained a very strong footing in Alaska. The vegetable does well in the coast region and probably would do moderately well in the interior. Horse-radish requires a deep, rich, loose soil for the production of large, fleshy, tender roots. The root is the edible portion of the plant. Horse-radish deserves to be much more widely cultivated and more generally used than is now the case. It is propagated by planting sections of the root on raised beds, which facilitate digging. The beds should be 2½ feet wide and raised a foot or so above the general surface. Long, slender roots of the thickness of a pencil should be used for planting. They should be shortened to 12 inches and have all side rootlets removed to confine growth to the main root. A long dibble should be used to make the holes, and the holes should be spaced a foot apart in the edges of the bed. The root sections are set in these holes each at an agle of 45° so that the upper end lies just below the surface. The soil should then be firmed about the root. The plants should produce fairly thick roots of usable size by the end of the first season. The roots will continue to increase in size if they are left in the ground for several years.

Rhubarb.—Rhubarb does well nearly everywhere in Alaska. (Fig. 5.) It is propagated either by division of the old roots or from seed. The former method is preferable when the roots can be obtained. The seed should be sown as early as the ground can be put in condition. When the plants are 3 to 4 inches high they should be either thinned out or transplanted 6 inches apart. The following spring they should be set 3 feet apart in deep, rich, well-prepared soil. Complaints occasionally reach the station that the leaf stem, for which the plant is grown, does not become as large as is desirable. In such cases the plant is starved. To grow large stems the ground must be rich and well drained. Seedling plants should furnish large stems the third year. The seed stalks should be cut down as soon as they appear, because they waste the strength of the plant. At no time should all the leaves be removed from the plant. This would reduce its vigor. It is well to place a few forkfuls of barnyard manure on each plant in the fall to be dug under about it in spring, care being taken not to injure the roots in so doing. Fine rhubarb has been raised at Sitka for many years. Giant Red, also called St. Martin's, is the best variety so far tried.

Beans.—Of the many varieties of snap beans in common culture a few can be grown in Alaska in favorable seasons, but even under the best conditions they do not grow as well as in lower latitudes. Snap beans are more successful in the interior, where the summers are warmer, than in the coast region. Snap beans should be given the warmest place in the garden and a well-drained sandy loam in which

to grow. Only the early bush beans and the English dwarf varieties mentioned later should be tried. Lima beans and pole beans invite failure. Some time after May 15 the beans should be planted in rows 1½ or more feet apart so that hoeing may be practiced. Weeds must be suppressed and the soil kept loose. Snap beans are grown for their pods, which are usable from the time they are about 2 inches long until nearly full grown. The varieties producing small pods at the stations include Extra Early Valentine, Extra Early Refugee, Golden Wax, and Black Wax. Possibly other varieties may do as well. Only the earliest sorts should be planted.

English dwarf beans can be successfully grown in Alaska. The plants are coarse, stocky, and hairy, and while they will not withstand frost they do better in a cool, damp climate than does the common snap bean. For this reason they are largely grown in England and in northern Europe. They will probably become popular in

FIG. 5.—Giant rhubarb growing at Sitka station

Alaska as soon as they are known. English dwarf beans have been successfully grown many times at Sitka. Only the seed, or bean proper, is used. The English dwarf bean is represented by the variety Broad Windsor (*Vicia faba*). It is as large as the Lima bean and resembles it in taste, and when properly cooked is delicious. The Broad Windsor plant is stiff, coarse, woolly, and about 3 feet high. The stalk is studded with numerous fleshy pods about 4 inches long. The beans, or seed proper, are used when they are nearly full grown before ripening. Of the many kinds of Broad Windsor beans upward of 40 varieties have been tested at Sitka. The beans should be planted 4 inches apart in rows 2 feet apart about May 15. They must be given good culture, and the top should be pinched off the plant when the pods begin to form. Broad Windsor beans are not commonly offered for sale by American seedsmen, but the bush Lima is advertised instead. The Lima is too tender for

Alaska. Since the Broad Windsor is practically unknown in Alaska, directions are here given for cooking it.[3]

It is of prime importance in the preparation of the broad bean for the table that the pods should be gathered while the young beans are still small, because a strong flavor is developed as they grow older. Not only should the pods be picked while still young but the beans should be prepared for the table as soon as possible after gathering. The following recipes are used in a private home in England:

Ordinary style.—To each half gallon of water allow 1 heaping teaspoonful of salt. The beans should be young and freshly gathered. After shelling, put them in boiling water salted as above. Boil rapidly until tender, then drain in a colander, dish, and serve with them, but in a separate bowl, a sauce of parsley and butter. Boiled bacon is often served with the beans. Cook very young beans for 15 minutes and beans of moderate size for 20 minutes or longer. Older beans should have the skin removed.

Broad beans à la poulette.—Use 2 pints of beans, one-half pint of stock or broth, small bunch of savory herbs (including parsley), small lump of sugar, yolk of one egg, and one-fourth pint of cream. Pepper and salt to taste.

Shell some small freshly gathered beans; boil as in preceding recipe until nearly done, then drain and put in the stewpan with the stock, finely minced herbs, and sugar. Stew until the beans are perfectly tender and the liquid has dried away a little, then whip up the yolk of the egg with the cream and add to the beans. Let the whole get thoroughly hot, and serve when it is on the point of simmering. The skin should be removed from the large beans before boiling. Boil for 10 minutes, or stew for 15 minutes.

Sword Longpod is a variety which is cultivated like the Broad Windsor, but the beans are smaller. Early Mazagan is a bean of the same class, but rather earlier and smaller. The small horse bean is, as its name implies, often grown in Europe as a feed for horses but is also of good table quality. All are cooked like the Windsor.

Sea kale.—Sea kale (*Crambe maritima*) is much esteemed in Europe, but is seldom grown in America, and has not as yet been introduced into Alaska. It is a native of central and northern Europe, where it grows wild along the seashore. Sea kale has been brought under culture for the sake of its stems, which are used as a salad. Being naturally a sea plant, it should do well in the coast region of Alaska, and seaweed is one of the best fertilizers for it. Half a dozen of the seeds should be sown in clumps 2 feet apart where the plants are to stand. The stems should not be cut until the spring of the third year, and must be blanched so that they will be tender and crisp. To this end the plants should be covered with frames a foot high. The frames are gradually filled with sand for the shoots to grow through. The shoots are cut at the base when they are upward of 6 inches high.

Japanese asparagus.—Japanese asparagus (*Aralia cordata*) is indigenous to Japan where it forms great thickets in scoriæ at the base of foothills. This perennial has been grown for 20 years at Sitka and gains annually in vigor. The Japanese transfer the wild plants to richly prepared soil. When the shoots appear the earth is heaped up over them to blanch them. Then, as the shoots emerge like asparagus they are cut for market. Japanese asparagus is a spring vegetable which is peddled from house to house in Japan.

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[3] These recipes have been kindly furnished by David G. Fairchild, agricultural explorer of the United States Department of Agriculture.

GROUP 3

Vegetables of Group 3 are not entirely hardy in Alaska, but they succeed in some localities in favorable seasons. Some of them do well in the interior, where the summers are warm.

Asparagus.—Repeated efforts to grow asparagus at Sitka have been practically unsuccessful. The plant is not tender but requires a warm season. When possible asparagus plants should be purchased from nurserymen or others who have them for sale. Strong, 1-year-old plants are preferable to older ones. A warm, well-drained spot should be selected for the permanent beds, and in the fall the soil should be covered with stable manure to a depth of 6 inches. Work the soil to a depth of 2 feet and thoroughly incorporate the manure with it. The amount of manure recommended may seem to be in excess of actual needs, but the gardener must remember that the bed is to last for many years and that this is the only chance to enrich the soil thoroughly. After the ground is prepared, set the plants out about May 15. The beds should be 2½ feet wide. The plants should be set a foot apart in two rows 18 inches apart on each bed. Holes for planting should be 2 inches deep, a little higher in the center than at the sides and sufficiently wide to receive the full length of the roots without causing the ends to curl. The roots should be spread horizontally like so many spokes in a wheel. The soil can then be placed on the roots and the bed leveled. During the first season cultivation can be confined to suppressing weed growth. In the fall the beds should be protected with a covering of stable manure or seaweed. The following spring before growth starts the covering should be removed and a 2-inch layer of soil spread over the bed. The shoots from the young plants should not be disturbed. The following fall the bed should be again covered with some protective material, and in the spring the covering should be replaced with a 2-inch layer of soil.

If the plants are making satisfactory growth some of the larger shoots can be cut, but spindling shoots should be allowed to remain undisturbed for another year. The bed is raised somewhat above the general surface for three reasons: (1) To enable the sun to strike the soil fully and warm it quickly in the spring; (2) to facilitate drainage; and finally (3) to permit cutting of the shoots while they are white and tender. The shoots grow through a layer of soil several inches deep and do not turn green. Vigorous asparagus shoots should be cut as soon as they emerge from the surface, care being taken not to injure the developing buds at the base. From these buds other shoots are to grow, hence the soil should be removed from about the shoot before cutting so that the grower can see what he is doing.

White shoots about 4 inches long, cut just as soon as the head emerges from the soil, are best for canning. Market gardeners, however, prefer to let the shoots grow 5 to 6 inches above ground before cutting. The shoots are then green but they can be handled more rapidly and economically than the white shoots. Grown in rich soil and given good care, an asparagus bed should be productive for 20 years. It is at home near the seashore and may be given a top dressing of coarse salt yearly to aid growth.

Celery.—Celery can be grown successfully in favorable seasons and under favorable conditions. It can not be depended on to yield

satisfactory results every year. Celery growing is more successful in the interior than on the coast. The plants should be started earlier than is the practice in the States. Growth is very slow at first, and a whole season is required for development. The seed must be sown in a fine, sandy loam. Sow in hotbeds or coldframes in March or April. The seed can be scattered either broadcast or in rows 3 inches apart, then covered very lightly, not more than a tenth of an inch deep, with sifted, sandy loam. The plants need no care except to be kept watered and free from weeds. Celery, like all other plants that are raised under glass, must be given ventilation daily. In bright sunny weather the ventilation should be abundant to prevent the temperature from rising too high. Later the seedlings should be transplanted to another coldframe where the soil is rich to enable them to develop without crowding and to hasten growth. The transplanted seedlings should be set 3 inches apart each way. In late June they should be planted in the open. Select for the purpose a protected spot where the soil is rich and thoroughly drained. A sandy loam is to be preferred, and it must be fertilized unless naturally rich. Thoroughly decayed stable manure and pulverized chicken manure are good fertilizers for celery. These should be well incorporated with the soil. The plants should be set 6 inches apart in rows 3 feet apart.

At Sitka trenches are dug a foot deep. A layer of manure is then well spaded into the bottom, and two rows of plants are set in it 6 inches apart each way. Then as the stalks grow blanching is done by gradually filling in the earth until the trench is full. Blanching consists merely in depriving the stalks of light to remove the coloring matter from them. When the plants are set on the surface of the ground and not in trenches, blanching may be accomplished by loosely tying the leaves of each plant together, then boarding up the sides of the row and filling in the spaces between the plants with soil. The boards are used only to confine the earth, and if desired, it is sufficient simply to draw the soil up about the plants.

When the gardener wishes to economize space celery may be grown in beds 4 feet wide and of any desired length. The soil should be heavily fertilized and the plants set 6 inches apart each way. In rich soil they will make almost as good growth as in single rows. At blanching time inclose the sides of the beds with boards and fill in the spaces between the plants with soil. Closer planting occasionally is advocated to exclude the light by crowding, in which case no further blanching is necessary.

For storing celery the plants can stand where they have been grown if the gardener has no better place for them. In such case they should be protected with a covering of boards to shed water, and as the cold weather advances the boards should be covered wih earth, seaweed, hay, or other material to exclude frost. This plan works when the plants are grown in a close bed as just described. If they are grown in rows farther apart a trench should be dug where the water does not stand. The trench should be as deep as the plants are tall. Pack the plants in an upright position with their roots in this trench and cover with a board on which earth or other material is placed to exclude frost.

Only a few of many varieties of celery have been grown at the station. · Those recommended for trial include Improved White Plume, an excellent variety, which has given satisfaction not only at the station but also in some of the market gardens; Kalamazoo, a good market celery which is much grown in Michigan; and Golden Self-Blanching, a somewhat less vigorous kind than either of the foregoing, but the best in quality. Golden Self-Blanching is naturally yellow in color and when planted close will blanch of itself. It has done well at Sitka.

Cucumbers.—Cucumbers are best raised under glass. Market gardeners in the interior grow them extensively in greenhouses by training the vines on wires under the glass. They can, however, be grown by settlers in interior Alaska under favorable conditions. Cucumbers should be planted in a sandy, well-drained soil in a protected place which receives the full benefit of the sun. Varieties which do not run too much to vine should be given the preference. The seed should be dropped 3 inches apart in rows 5 feet apart. When the plants are well started they should be thinned to 6 inches apart and the alternate plants trained to grow in opposite directions. Do not sow the seed before June 15, by which time the weather usually warms up. Cucumber culture is simple. The ground should be frequently hoed until the vines cover it, and the weeds should be pulled as they appear. Under favorable conditions cucumbers of fair size or at least for use in pickling should be ready by September 1.

Cucumbers can be started in small pots or boxes about May 1 and the containers sunk in the earth in a hotbed, where they should be allowed to remain until early June. The young plants can then be set out. Two seeds should be placed in each container, and the weaker of the resulting plants should be removed. Before they are removed the soil in the containers should be well watered so that the plants can be turned out without disturbing the roots. Varieties recommended for trial include Improved White Spine, Early White Spine, Early Cluster, and Early Russian. The two last named are pickling varieties.

Squash.—Squash requires the same care as the cucumber, and seldom succeeds in Alaska. In favorable seasons the plants may produce small fruits. Early White Bush Scallop is perhaps the kind most likely to succeed in Alaska. Other bush varieties are Extra Early Jersey White Bush, Early Golden Bush, Summer Crookneck, and Giant Summer Crookneck.

Salsify.—Salsify, sometimes called oyster plant because of the strong resemblance of its flavor to that of the oyster, is grown for its roots, which are stewed and eaten in various styles. Salsify is generally classed with the hardy vegetables, but results of experiments at Sitka show that it belongs with the tender plants of Group 3. Salsify never has given satisfaction at the station. The plant requires a well-drained sandy loam. On wet peaty soil the root branches so much as to be worthless. The seed, which is rather large, should be sown in rows 2 feet apart and covered to a depth of three-quarters of an inch. Salsify requires the same care as carrots or parsnips. It needs warm weather only during the growing period. Once grown, the roots are as hardy as parsnips and can be left in the ground in winter, at least in southeastern Alaska. There are

only a few varieties. Mammoth Sandwich Island is a favorite with market gardeners. Large White is the variety most likely to succeed in Alaska.

Scorzonera, or black salsify, is hardier than either of these. The roots can be left in the ground for two or more years, during which time they will continue to grow. The roots have dark, almost black, skins.

FLAVORING HERBS

Many of the flavoring herbs can be grown in Alaska. Their culture is very simple. Sow in short rows in warm dry soil in early spring. The following kinds of herbs have done well at the Sitka station:

Mint.—Both garden mint and peppermint are hardy perennials with running underground stems. Mint is best propagated by dividing the rootstock in the spring. Mint requires no protection in the coast region and can be raised from seed.

Sage.—Sage is a half-woody perennial which is well known everywhere. Propagate by seed, also by burying the branches, which then take root. Sage requires winter protection.

Thyme.—Thyme, a half-woody perennial, should be planted in the early spring and the young plants transplanted to where they are permanently wanted. Thyme is winterkilled unless it is given protection.

Rosemary.—The leaves of rosemary, a perennial herb, are used for seasoning.

White savory.—White savory is a hardy perennial also used for seasoning.

Horehound.—Horehound is a half-hardy perennial that requires winter protection.

Sweet fennel and catnip.—Sweet fennel and catnip are half-hardy perennials that require winter protection.

Coriander.—Coriander is a hardy perennial which is used for flavoring and in candy making.

Caraway.—Caraway is a biennial plant which is grown for its seed and is much prized in Europe. It should be sown in early spring. The plants seed the second year and must be given winter protection.

Marigold.—Marigold, a hardy annual, is sometimes used for seasoning and is grown also for its flowers. Sow in the spring.

Dill.—Dill, a hardy annual, is grown for its seed and is much used in flavoring pickles.

Other herbs.—Other annual herbs doing well include anise, summer savory, sweet majoram, sweet basil, and borage.

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